Are Structural Brain Abnormalities Associated With Suicidal Behavior In Patients With Psychotic Disorders?

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Introduction

The understanding of the neurobiological underpinnings of suicidal behavior remains far from complete. Recent studies report that structural differences in the left orbitofrontal and superior temporal gyri are associated with suicidal behavior in schizophrenia. This study compares regional brain volumes between groups of patients with psychotic disorders, specifically patients with either schizophrenia (SZ), schizoaffective disorder (SZA) or psychotic bipolar disorder I (BP-P). First, we separated these subjects into groups of attempters and non-attempters. We then divided the attempters according to medical lethality of the attempt, into high lethality and low lethality attempters. Additionally, we compared low lethality attempters to non-attempters to minimize the possibility that the observed differences were the result of the attempt itself.

Methods

489 individuals with SZ, SZA, or BP-P and 262 healthy controls enrolled in the B-SNIP study were studied. Groups were compared by attempt history and the highest medical lethality of previous suicide attempts. 97 patients had a history of a high lethality suicide attempt, 51 of a low lethality attempt and 341 had no attempt history. Cortical and subcortical gray matter volumes were obtained from 3T structural MRI scans using FreeSurfer. ANCOVAs were used to examine differences between groups, co-varying for age, sex, scanner site, and total intracranial volume followed by Hochberg multiple comparison correction.

Results

Compared to non-attempters, attempters had statistically significantly less gray matter volume in bilateral inferior temporal and superior temporal cortex, left supramarginal gyrus, thalamus and supramarginal gyrus, right insula, superior frontal and rostral middle frontal regions, when compared to non-attempters. Among attempters, a history of high lethality attempts was associated with significantly smaller volumes in the left lingual gyrus and right cuneus. Compared to non-attempters, low lethality attempters had significant decreases in the left supramarginal and thalamus and the right insula.

Conclusions

Specific structural brain abnormalities may distinguish suicide attempters from non-attempters and high from low lethality attempters among individuals with psychotic disorders. Regions in which differences were observed are known to mediate inhibition and impulsivity (superior frontal and superior temporal regions), and emotion, visceral, visual and auditory perception (insula, thalamus, posterior cortical regions). The results of this study could be of significant clinical interest. When alterations in specific brain regions are validated, they could be used as potential clinical corroboration for clinicians to further assess suicide risk of the patient. Furthermore, these regions could be used as biomarkers for the pathophysiology of suicidal behavior in individuals with psychosis. Ideally it could contribute to the development of a neurobiological signature of risk.